MCHB-TS-OEN
23 May 2005

INFORMATION PAPER

SUBJECT: Factory Permethrin Treatment of Army Field Clothing

1. Purpose. To provide information on the factory permethrin treatment of Battle Dress Uniforms (BDUs), Desert Camouflage Uniforms (DCUs), and Army Combat Uniforms (ACUs).

2. Facts.

a. Skin and clothing repellents are critical in mitigating arthropod-borne diseases, such as malaria, leishmaniasis, and Lyme disease. Clothing repellents have been used by the military for this purpose since before WWII (e.g. M-1960 and benzyl benzoate).[1]

b. In June 1987, the Department of the Army approved a Joint Services Operational Requirement (JSOR) for an insect/arthropod repellent system, to include uniforms impregnated with a durable, effective, safe, soldier acceptable repellent.[2]

c. Permethrin is much more effective and longer-lasting than previous repellents. In 1990, the DoD fielded permethrin as the standard military clothing repellent, following EPA approval of 4 methods: Individual Dynamic Absorption (IDA) kit, 2-gallon sprayer, aerosol spray can, and factory treatment. Individual soldiers have been using IDA kits or aerosol spray cans, and unit spray teams have been using 2-gallon sprayers, to apply permethrin to clothing since its introduction. Factory permethrin-treated uniforms have not yet been fielded, resulting in total continued reliance on soldiers and units to treat their own uniforms with permethrin.

d. The factory treatment method results in the same fabric concentration as both the IDA kit and 2-gallon sprayer methods (0.125 mg/cm^2), yet yields more consistent and uniform treatment throughout the fabric; is more expedient; and is the most environmentally and soldier-safe application method. Factory treatment will clearly reduce individual soldier and unit spray team exposure, and will greatly improve compliance.

e. Uniforms initially treated at a target concentration of 0.125 mg/cm^2 offer over 90% protection from bites by important mosquito species through 50 or more washes.[3]

f. In August 1992, the Army Clothing and Equipment Board (ACEB) recommended that all DCUs, as well as BDUs worn in garrison or non-deployment situations, be factory-treated with permethrin.[4]

g. In 1998, the Defense Logistics Agency assigned stock numbers for factory permethrin-treated uniforms: woodland temperate (Type IX), woodland enhanced hot weather (Type X), and desert camouflage (Type XI). These treated uniforms were advertised for sale by the Defense Supply Center Philadelphia (DSCP).[5] However, they never became available, except when units or organizations initiated funded contracts through DSCP.

h. In August 1994, at the request of the U.S. Army, the National Research Council's (NRC) Committee on Toxicology (COT) concluded after an extensive review of toxicity data on permethrin, that "soldiers who wear permethrin-impregnated BDUs [at a fabric concentration of 0.125 mg/cm^2 for 18 hrs/day for 10 years] are unlikely to experience adverse health effects."[4]

i. Soldier acceptance studies have confirmed the desirability, safety, and efficacy of factory-treated uniforms.[6]

j. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) provided Health Hazard Assessments (HHAs) in July 1984 and August 2004, confirming that uniforms treated with permethrin at a fabric concentration of 0.125 mg/cm^2 are safe for wear by soldiers for 18 hrs/day for 10 years.[7,8]

k. Since July 2003, a commercial line of factory permethrin-treated clothing, including children's clothing, has been EPA-registered and marketed to the general public (at a permethrin concentration of 0.52% $\pm$ 10% [this EPA-approved percentage equals 0.137 mg/cm^2 $\pm$ 10% in the ACU military nylon/cotton rip-stop fabric, and does not limit the type or weight fabric that can be impregnated/marketed]).[9]

l. The USACHPPM provided an updated HHA in May 2005, confirming that uniforms treated with permethrin at an increased fabric concentration of 0.137 mg/cm^2 (0.52% weight/weight), increased time frame (20 years), and increased skin absorption rate (7%) are safe for wear by soldiers.[10]

m. Factory permethrin-treated BDUs, DCUs, and ACUs (minus maternity uniforms) have been requested by the U.S. Army Training and Doctrine Command (TRADOC)[11]. The U.S. Army Office of the Surgeon General (OTSG)[12], U.S. Army Test and Evaluation Command (ATEC)[13], and Armed Forces Pest Management Board (AFPMB)[14] have also requested that uniforms be factory-treated. Factory permethrin-treated uniforms are currently being fielded by the Marines Corps[15], and have been issued to all West Point cadets by U.S. Military Academy (USMA) contract since 2002.[16]

n. Pregnant and nursing female soldiers are not deployed and would not be issued factory-treated clothing. They wear untreated maternity uniforms. Note: If necessary, dry-cleaning a treated uniform will remove all the permethrin.[9,17]

o. For the general public, the Centers for Disease Control and Prevention (CDC) recommends use of permethrin-treated clothing and DEET skin repellent for pregnant and nursing women traveling to areas where they will be exposed to disease carrying insects.[18]

p. According to both the National Academy of Sciences Committee on Toxicology and the Natick Research, Development, and Engineering Center (NRDEC = Natick Soldier Center), almost all permethrin lost from uniforms is lost in the wash water, and little permethrin is transferred to non-treated clothing that is laundered with treated uniforms.[4,19]

ADDED to Information Paper since May 2005:

q. On 21 June 2005, the Army Surgeon General officially reiterated the critical importance of providing permethrin-treated uniforms to soldiers, and fully endorsed the safety and efficacy of permethrin factory-treated uniforms.[20]

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References.

1. Armed Forces Pest Management Board (AFPMB), Technical Information Memorandum No. 9, June 1961, The Use of Insect Repellents on Clothing.

2. Memorandum, U.S. Army Training and Doctrine Command (TRADOC), ATCD-SE, 25 June 1987, subject: Joint Service Operational Requirement (JSOR) for Insect/Arthropod Repellent System.

3. Materials Examination Report (MER) No. 8868, NRDEC, Sep 1987, Interim Report on Contract for Further Investigation of the Application of Permethrin to Battle Dress Uniforms (BDUs), with protection and knockdown data from the U.S. Department of Agriculture (USDA), Gainesville, FL. [Even after knockdown no longer occurs (the permethrin-treated fabric no longer kills insects), treated fabric continues to provide excellent protection from bites (by virtue of its contact repellency) through at least 50 washes.]

4. National Academy of Sciences (NAS), National Research Council (NRC), Committee on Toxicology (COT). 1994. Health Effects of Permethrin-Impregnated Army Battle-Dress Uniforms.

5. Defense Supply Center Philadelphia (DSCP), Clothesline, November/December 1998, The Latest in Battledress Uniforms.

6. U.S. Army Soldier and Biological Chemical Command (SBCC), Natick, 8 May 2002, User Evaluation of Factory Treated Permethrin Field Uniform, Fort Polk, LA.

7. Memorandum, U.S. Army Environmental Hygiene Agency (USAEHA), HSHB-OA, 26 July 1984, subject: Health Hazard Assessment Report on Permethrin as an Insect/Arthropod Repellent Applied to Military Clothing, Project No. 69-37-4540-84.

8. Memorandum, U. S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), MCHB-TS-OHH, 16 August 2004, subject: Input to the Safety Confirmation for the Permethrin Treated Battledress Uniform (BDU), Health Hazard Assessment Program Project No. 69-MP-4540-04.

9. Buzz Off Insect Shield Apparel, EPA Registration No. 74843-2, 7 July 2003. (Applies to a wide variety of garment types (e.g. shirts, pants, socks, hats, etc.), fabric types (e.g. nylon, cotton, polyester, and combinations), and fabric weights (e.g. knits, weaves).

10. Memorandum, USACHPPM, MCHB-TS-OHH, 17 May 2005, subject: Change to Input to the Safety Confirmation for the Use of Permethrin Treated Army Clothing, Project No. 69-MP-4540-05.

11. Memorandum, U.S. Army TRADOC, ATMD, 10 December 2004, subject: Recommendation for Manufacturer-Treated Battle-Dress Uniforms (BDUs), Desert Camouflage Uniforms (DCUs), and Army Combat Uniforms (ACUs) with Permethrin.

12. Memorandum, Department of the Army, Office of the Surgeon General (OTSG), DASG-PPM-SA, 8 April 2005, subject: Safety of Permethrin Treated Uniforms.

13. Capabilities and Limitations Report, Army Test and Evaluation Command (ATEC), March 2005, Permethrin-Treated Battle Dress Uniforms (BDU's).

14. Memorandum, Armed Forces Pest Management Board (AFPMB), ODUSD(IE), 13 August 2004, subject: Health Benefits of Uniforms Factory Treated with Permethrin.

15. Decision Paper, Commandant Marines Corps, 10 May 2004, subject: Insect Repellency Product Improvement to the Marine Corps Combat Utility Uniform.

16. Memorandum, U.S. Military Academy (USMA), West Point, MALO-CS, 26 September 2002, subject: After Action Report for Treatment of Battle Dress Uniforms (BDUs) with Permethrin Insect Repellent.

17. AFPMB, Technical Guide No. 36, Personal Protective Measures Against Insects and Other Arthropods of Military Importance, online, April 2002, www.afpmb.org.

18. Centers for Disease Control and Prevention, Traveler's Health, 2003-2004 Yellow Book. ["Like malaria, other vector-borne illnesses may be more severe in pregnancy and/or bear potential harm to the fetus. Pregnant travelers should scrupulously avoid insects with covering clothing, bed nets, use of permethrin for clothing and nets, and application of DEET-containing repellents." Also, "Personal protection against mosquitoes is an important part of prevention against malaria, yellow fever, and other diseases for which no prophylaxis is available, such as dengue fever. Children should wear protective clothing and sleep under bed nets, both of which can be impregnated with the insecticide/repellent permethrin."]

19. Memorandum, Natick Research Development and Engineering Center (NRDEC), STRNC-ITCP, 28 December 1989, subject: Interim Progress Report on Arthropod Repellent Impregnant Project, April 1989 – December 1989.

20. Memorandum, Department of the Army, Office of the Surgeon General, DASG-PPM-SA, 21 June 2005, subject: Safety of Permethrin Treated Uniforms.